

**MULTIMEDIA**



**UNIVERSITY**

**STUDENT ID NO**

|  |  |  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|--|--|

**VENUE** : \_\_\_\_\_

**SEAT NO** : \_\_\_\_\_

# **MULTIMEDIA UNIVERSITY**

## **FINAL EXAMINATION**

**TRIMESTER 1, 2019/2020**

**TCP 2451–PROGRAMMING LANGUAGE TRANSLATION**

( All sections / Groups )

25 OCTOBER 2019  
9.00 am – 11.00 am  
( 2 Hours )

| Question     | Marks |
|--------------|-------|
| 1            |       |
| 2            |       |
| 3            |       |
| 4            |       |
|              |       |
| <b>Total</b> |       |

### **INSTRUCTIONS TO STUDENTS**

1. This Question paper consists of 10 pages with 4 Questions only.
2. Attempt All Questions. The distribution of the marks for each question is given.
3. Write all your answers in this Question paper.

**Question 1**

(a) Give a programming language example that is translated using a compiler. Explain why the given programming language is a compiler based translator. [2]

(b) Give a programming language example that is translated using an interpreter. Explain why the given programming language is an interpreter based translator. [2]

(c) Give a programming language example that is translated using a hybrid compiler. Explain why the given programming language is a hybrid based translator. [3]

**Continued .....**

(d) Give one advantage of a compiler over an interpreter. [2]

|  |
|--|
|  |
|--|

(e) Give one advantage of an interpreter over a compiler. [2]

|  |
|--|
|  |
|--|

(f) Indicate yes or no of the following terms when applied to the Java programming language. [1.5]

- i. scripting
- ii. declarative
- iii. fourth generation

|      |
|------|
| i.   |
| ii.  |
| iii. |

**Continued .....**

**Question 2**

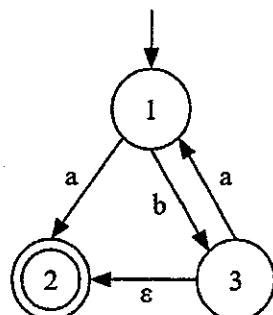
(a) Consider the following grammar. [3.5]

$$\begin{aligned} E &\rightarrow T X \\ T &\rightarrow ( E ) \mid \text{int } Y \\ X &\rightarrow + E \mid \epsilon \\ Y &\rightarrow * T \mid \epsilon \end{aligned}$$

- i. Find the set for the FIRST(E).
- ii. Find the set for the FIRST(X).
- iii. Find the set for the FOLLOW(E).
- iv. Find the set for the FOLLOW(X).

|      |
|------|
| i.   |
| ii.  |
| iii. |
| iv.  |

(b) Consider the following NFA. [9]



- i. Explain what  $\epsilon$ -closure of a state is using an example from the above NFA.

|  |
|--|
|  |
|--|

**Continued .....**

- ii. Convert the NFA to a DFA using subset construction. Provide all the steps, the transition table, and the DFA.

**Continued .....**

### Question 3

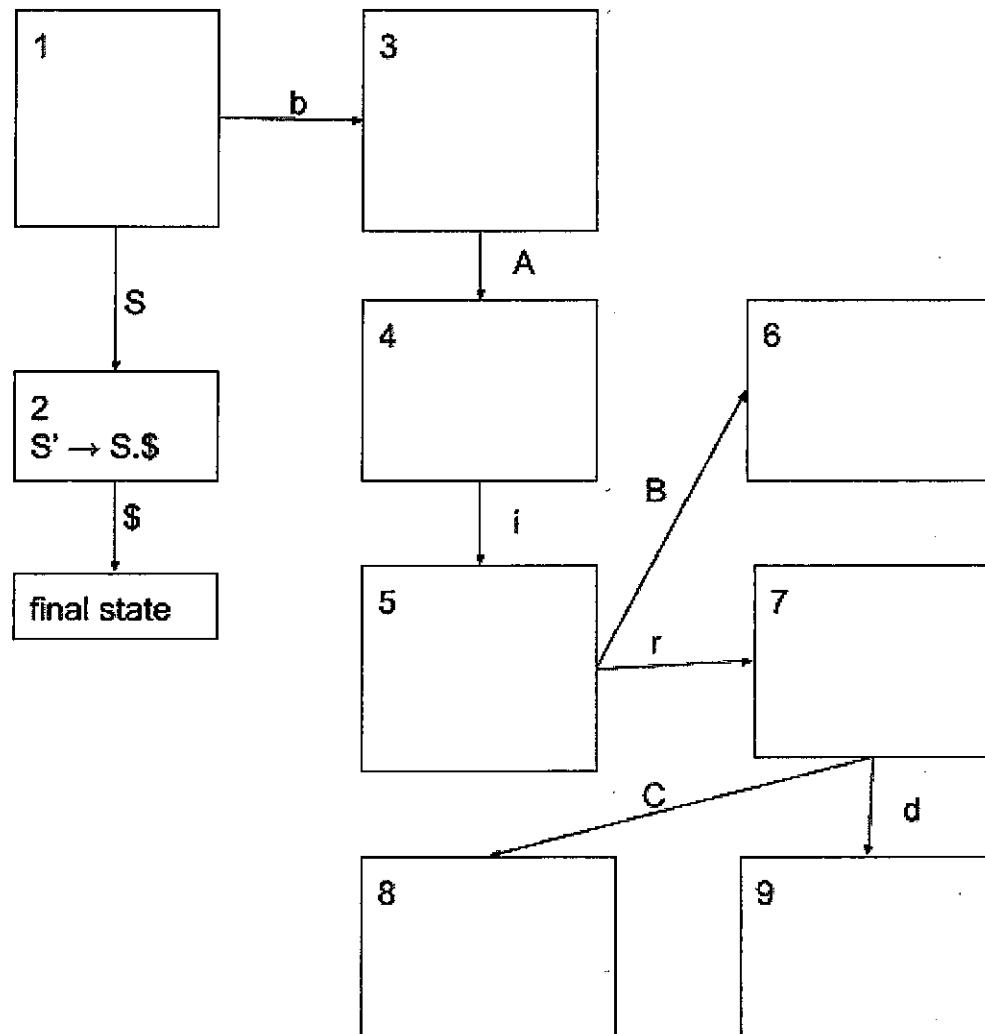
Consider the following grammar.

$$\begin{aligned} S &\rightarrow b \ A \ i \ B \\ A &\rightarrow \epsilon \\ B &\rightarrow r \ C \\ C &\rightarrow d \end{aligned}$$

where  $b$ ,  $d$ ,  $i$ , and  $r$  are terminals.

(a) Augment the start symbol. [1]

(b) Complete the following DFA of LR(0) to illustrate transitions between states for the augmented grammar by giving all the states of items. [8]



Continued .....

(c) Construct the LR(0) parsing table. [3.5]

**Continued .....**

**Question 4**

(a) Consider the following code segment. [2]

```
var = 3108;  
double var;
```

Does the above code segment have scope error? Explain your answer.

(b) Optimize each of the following code segment and then explain your answer. [5.5]

i.

```
ST x y  
ST y x
```

ii.

```
LD R2, R1  
GOTO L1  
L1: GOTO L2  
L2: INC R1
```

**Continued .....**

(c) Convert the expression  $-(a-b)+c$  into each of the following. [5]

- i. syntax tree
- ii. three-address code
- iii. quadruples
- iv. triples
- v. indirect triples

i.

ii.

iii.

**Continued .....**

iv.

v.

**End of Page**